3D Bin

Contents

3D Binomial Distribution

[ToC]

D.1 Binomial Random Variable

- **Analogy:** Number of heads in n tosses. **Possible Values**: $0, 1, 2, \ldots n$
- pmf of Binomial(n, p) is

$$P(X = x) = \texttt{dbinom(x,n,p)} = \binom{n}{x}(1-p)^{n-x}p^x$$

- CDF of Binomial(n, p) is

$$P(X \leq x) = \texttt{pbinom(x,n,p)} = \sum_{k=0}^{x}\binom{n}{k}p^k(1-p)^{n-k},$$

  Some of the values are listed in Table A.1.

- Expectation and Variance:

$$E(X) = np \quad \text{and} \quad V(X) = np(1-p)$$

D.2 Binomial(n,p) on TI-84

x =[number of heads] n =[number of flip] p =[prob. of head in 1 flip]

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[2nd][vars]  to get [DISR] menu

binompdf(n,p,x)
binompdf(10, .5, 3)          #- p(3):  pmf of Bin(n=10, p=.5) at x=3

binomcdf(n,p,x)
binomcdf(10, .5, 3)          #- F(3):  CDF of Bin(n=10, p=.5) at x=3
```

D.3 Derivation of Binomial pmf

D.4 Ex: Multiple Choice Exam

Multiple Choice Exam has 30 questions, each with 5 choices. What is the probability that you get above 80% (≥ 24 questions) of you guesses all the questions?

D.5 Ex: Free-throw

Suppose that each time you take a free-throw, it has 80% chance of making a basket, and each throw is independent of one another. What is the probability that if you take 10 throws, you make more than a half?